

# Annexes – The Urban Land Nexus and Inclusive Urbanisation in Dar es Salaam, Mwanza, and Khartoum

## Contents

Annexe A – Partners and teams [page 2](#)

Annexe B – Methods: space syntax [page 3](#)

Annexe C – Methods: case studies [page 4](#)

Annexe D – Additional maps [page 9](#)

**These annexes are part of the outputs from the project ‘The Urban Land Nexus and Inclusive Urbanisation in Dar es Salaam, Mwanza and Khartoum’:**

**Synthesis Report** *Examining the Urban Land Nexus and Inclusive Urbanisation in Dar es Salaam, Mwanza, and Khartoum*

**Research Report** *Investigating the Urban Land Nexus and Inclusive Urbanisation in Dar es Salaam, Mwanza, and Khartoum*

**Briefing Note 1** *The Urban Land Nexus and Inclusive Urbanisation in Dar es Salaam, Mwanza, and Khartoum*

**Briefing Note 2** *The Urban Land Nexus and Inclusive Urbanisation in Dar es Salaam and Mwanza*

**Briefing Note 3** *The Urban Land Nexus and Inclusive Urbanisation in Khartoum*

This material has been funded by UK aid from the UK government; however, the views expressed do not necessarily reflect the UK government’s official policies. It is an output of a consortium undertaking a project titled ‘The Urban Land Nexus and Inclusive Urbanisation in Dar es Salaam, Mwanza and Khartoum’, led by the Institute of Development Studies (IDS), UK, in partnership with: University of Khartoum, Sudan; Ardhi University, Tanzania; Centre for Community Initiatives (CCI), Tanzania; Commonwealth Local Government Forum (CLGF); Istidama, Khartoum; International Institute for Environment and Development (IIED), UK; University of Copenhagen, Denmark; and Utrecht University, The Netherlands.



# Annexe A – Partners and teams\*

## Consortium partners

- ◆ Institute of Development Studies (IDS), UK
- ◆ University of Khartoum, Sudan
- ◆ Ardhi University, Tanzania
- ◆ Centre for Community Initiatives (CCI), Tanzania
- ◆ Commonwealth Local Government Forum (CLGF)
- ◆ Istidama, Khartoum
- ◆ International Institute for Environment and Development (IIED)
- ◆ University of Utrecht, The Netherlands

## Project teams

### Senior Research Management Team

- ◆ Alphonse Kyessi – Co-Investigator (Ardhi University)
- ◆ Gordon McGranahan – Principal Investigator (Institute of Development Studies)
- ◆ Salah M. Osman – Co-Investigator (University of Khartoum)
- ◆ Griet Steel – Co-Investigator (University of Utrecht)

### Project Management Team

- ◆ Poppy Bardwell – Project Administrator (Institute of Development Studies)
- ◆ Sadaf Khan – Project Coordinator (Institute of Development Studies)
- ◆ Gordon McGranahan – Principal Investigator (Institute of Development Studies)
- ◆ Jas Vaghadia – Project Manager (Institute of Development Studies)

### International Research Team

- ◆ Manja Andreasen (University of Copenhagen)
- ◆ Enrico Ille (Consultant to Institute of Development Studies)
- ◆ Sadaf Khan (Institute of Development Studies)
- ◆ Rajith Laksmann (Institute of Development Studies)
- ◆ Gordon McGranahan (Institute of Development Studies)
- ◆ Griet Steel (University of Utrecht)
- ◆ Cecilia Tacoli (International Institute for Environment and Development)
- ◆ Gareth Wall (Commonwealth Local Government Forum)

## Dar es Salaam and Mwanza Research Team

- ◆ Alphonse Kyessi – Team Leader (Ardhi University)
- ◆ Wilbard Kombe (Ardhi University)
- ◆ Guido Uhinga (Ardhi University)
- ◆ Fredrick Magina (Ardhi University)
- ◆ Samwel Alananga (Ardhi University)
- ◆ Maria Genes (Ardhi University)
- ◆ Yohannes Kachenje (Ardhi University)
- ◆ Timothy Ndezi (Centre for Community Initiatives)
- ◆ Stella Stephen (Centre for Community Initiatives)
- ◆ Samwel John (Centre for Community Initiatives)
- ◆ Prudenciana Luckago (Centre for Community Initiatives)

## Khartoum Research Team

- ◆ Salah M. Osman – Team Leader (University of Khartoum)
- ◆ Abu Bakre H. Mergani – Coordinator (University of Khartoum)
- ◆ Ibrahim Z. Bahreldin (University of Khartoum)
- ◆ Gamal M. Hamid (University of Khartoum)
- ◆ Khadiga M. Osman (University of Khartoum)
- ◆ Ahmed A. Elhasan (University of Khartoum)
- ◆ Salah Abukashawa (Istidama)
- ◆ Maha M. Eltahir (Ministry of Infrastructure)
- ◆ Asjad Faysal (Ministry of Infrastructure)
- ◆ Khalifa Khalil (Ministry of Infrastructure)
- ◆ Rania Elhadi Bushra (Eastern Nile University)
- ◆ Dhalia Elnahas (Eastern Nile University)
- ◆ Wahat A. Groon (Rabat University)
- ◆ Babiker Fath Alla (Ministry of Planning)
- ◆ Riham Hamza (Ministry of Planning)
- ◆ Amani Hassan (Ministry of Planning)
- ◆ Akram Idris (Ministry of Planning)
- ◆ Elkindi Alaagib (Ministry of Planning)
- ◆ Nuha M.E. Taha (Ministry of Planning)
- ◆ Aziza A. Kabashi (Ministry of Planning)
- ◆ Tahlil O. Wini (Ministry of Planning)
- ◆ Misaab G. Abdalla (Ministry of Planning)

\* For the purposes of authorship:

**Three City Land Nexus Research Team** comprises the Dar es Salaam and Mwanza Research Team, the Khartoum Research Team, and the International Team.

**Dar es Salaam and Mwanza Land Nexus Research Team** comprises the Dar es Salaam and Mwanza Research Team and Manja Andreasen, Sadaf Khan, Rajith Laksmann, Gordon McGranahan, Cecilia Tacoli, and Gareth Wall of the International Team.

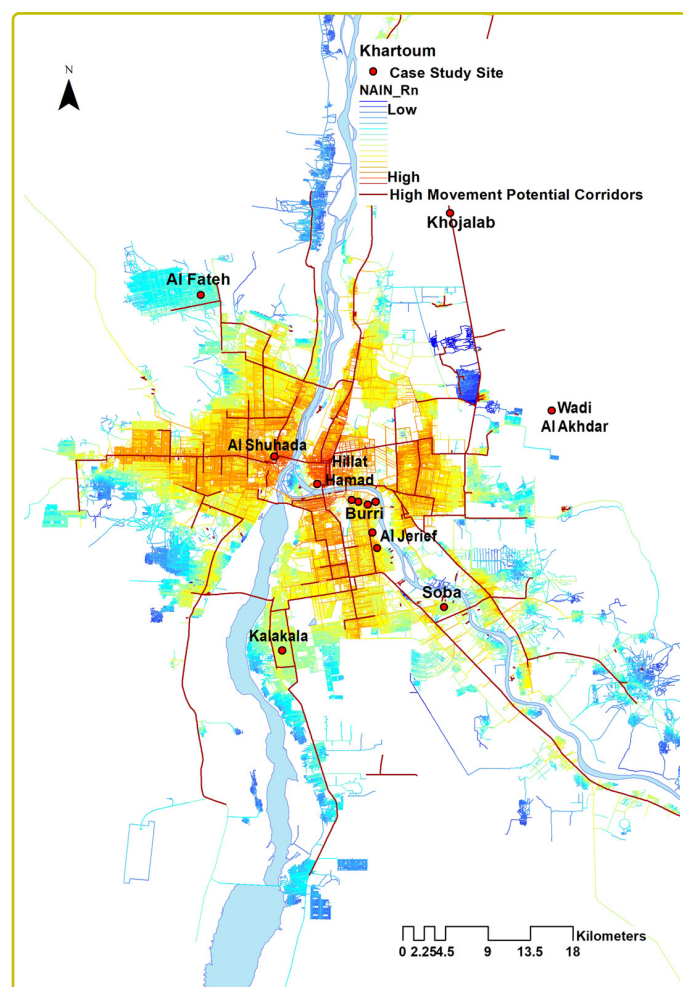
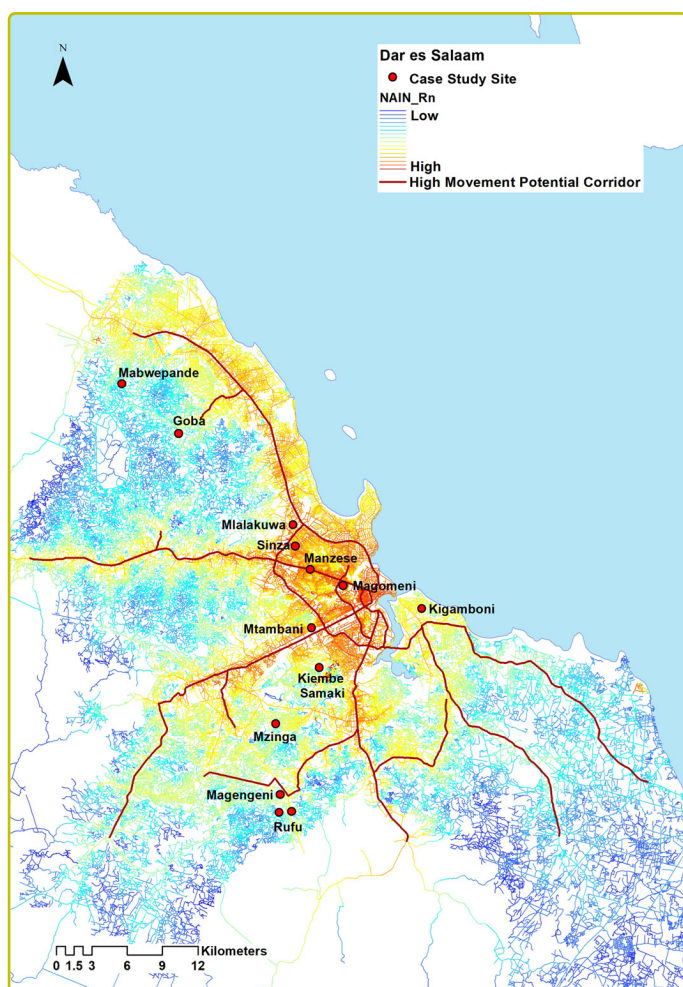
**Khartoum Land Nexus Research Team** comprises the Khartoum Research Team and Enrico Ille, Sadaf Khan, Gordon McGranahan, Griet Steel, and Gareth Wall of the International Team.

# Annexe B – Methods: space syntax

Space syntax is a set of tools and a theory of movement economies developed by Bill Hillier and Julienne Hanson at University College London (UCL) that examines the growth of cities through assessing the movement potential of their form, as indicated by networks of streets making their way through the city's land nexus. The process requires that the street network of a city is represented as a series of lines that connect and intersect, and each line is further reduced to segments that extend from intersection to intersection. Space syntax analysis assesses how accessible each of these segments is from all other segments in the system for any given radius from the scale of the city to that of a small neighbourhood – this is known as *integration*. Working on a spectrum, the analysis sorts segments from highly integrated or accessible (red in most space syntax maps) to least integrated or highly spatially *segregated* (dark blue in most space syntax maps, see Figure A1). This calculation

takes into account the segment length and the angle of change between one segment to the next; the longer, straighter and more connections each street has, the more likely it is to be highly accessible within the overall system.

A second measure, known as *choice*, assesses the likelihood that a street segment, depending on the spatial configuration of the complete system, is to be used as part of a route from anywhere to anywhere else in the system. Thus, *choice* is a measure of the *movement potential* of a segment and in space syntax analysis, the network of high movement potential streets is seen to highlight the underlying spatial structure of the city, picking out main arterial routes that cut across the city. Hence, in terms of spatial analysis of the form of the city, the key space syntax features used are spatial accessibility (*integration*), spatial segregation, and movement potential (*choice*).



**Figure A1** Global integration (accessibility) maps of Dar es Salaam (left) and Khartoum. Source: Basemap accessed from Open Street Map, space syntax maps generated by the Institute of Development Studies.

# Annexe C – Methods: case studies

## Methods: case studies

	Case study	Land nexus themes	Key informant interviews	Focus group discussions (FGDs)	Household surveys	Notes (including indication of other sources)
Dar es Salaam, Tanzania						
1	<b>Kigamboni</b>	Newtown/land conflicts	<ul style="list-style-type: none"> <li>Ministry of Lands officials (4)</li> <li>Former project managers (2)</li> <li>Senior government officials (5)</li> <li>Ward leaders (WEO) and their committees</li> <li><i>Mtaa</i> leaders (MEO) and their committees</li> <li>Prominent lawyer (pro-landowners)</li> </ul>	<ul style="list-style-type: none"> <li>1 FGD (3 members)</li> <li>5 women settlers</li> </ul>	<ul style="list-style-type: none"> <li>16 households</li> <li>5 elderly settlers</li> </ul>	<ul style="list-style-type: none"> <li>Kigamboni City project report</li> <li>Study report on water and sanitation in peri-urban areas</li> </ul>
2	<b>Manzese</b>	Gentrification	<ul style="list-style-type: none"> <li>Local Ward and <i>Mtaa</i> executive officers (WEO)</li> <li>Kinondoni municipal planners</li> </ul>	<ul style="list-style-type: none"> <li>4 Ward leaders (WEO/MEO) including 2 official public employees</li> <li><i>Mtaa</i> development committee (5)</li> </ul>	<ul style="list-style-type: none"> <li>164 households, including women-headed households</li> </ul>	<ul style="list-style-type: none"> <li>PhD draft thesis</li> <li>Unpublished paper by Gordon McGranahan</li> </ul>
3	<b>Goba</b>	Settlement formation	<ul style="list-style-type: none"> <li>Members of the <i>mtaa</i>/ward including women</li> </ul>	<ul style="list-style-type: none"> <li>4 FGDs (total 14 members)</li> <li>2 FGDs (total 4 people) for those who have resettled outside Goba</li> </ul>	<ul style="list-style-type: none"> <li>20 households</li> </ul>	
4	<ul style="list-style-type: none"> <li><b>Magomeni</b></li> <li><b>Suna to Mabwepande</b></li> </ul>	Resettlement	<p>At local level:</p> <ul style="list-style-type: none"> <li>1 Mabwepande Ward Executive Officer (WEO)</li> <li>1 Mji Mpya <i>Mtaa</i> Executive Officer (MEO)</li> <li>1 chairperson</li> </ul> <p>At ministerial and municipal level:</p> <ul style="list-style-type: none"> <li>Town planners</li> </ul>	<ul style="list-style-type: none"> <li>10 men</li> <li>12 women</li> <li>15 youths</li> </ul>	<ul style="list-style-type: none"> <li>60 household heads, including widows and women-headed households</li> </ul>	



## Methods: case studies

	Case study	Land nexus themes	Key informant interviews	Focus group discussions (FGDs)	Household surveys	Notes (including indication of other sources)
<b>Dar es Salaam, Tanzania</b>						
5	<b>Magengeni</b>	Formalisation and regularisation	<ul style="list-style-type: none"> <li>◆ The WEO for Chamazi Ward</li> <li>◆ The Administrator of the Applied Geodesy Consultancy</li> <li>◆ A member of the Mbande Magengeni <i>Mtaa</i> Committee</li> <li>◆ The <i>Mtaa</i> Chairman for Mbande Magengeni</li> </ul>	◆ 5 members of the <i>Mtaa</i> Committee	◆ 62 household heads/representatives, including 22 male and 40 female adults	<ul style="list-style-type: none"> <li>◆ Kyessi, A. (2010) – journal article</li> <li>◆ Kyessi, A. and Kyessi, S. (2007) conference paper</li> <li>◆ Land Act, No. 4 of 1999</li> </ul>
6	<b>Sinza and Mlalakuwa</b>	Water and sanitation – planned and informal areas	At local level: <ul style="list-style-type: none"> <li>◆ 2 WEOs for Sinza and Makongo wards</li> <li>◆ 2 MEOs</li> <li>◆ 2 chairpersons for Mlalakuwa and Sinza A Mitaas</li> <li>◆ Chairperson of the Sanitation Committee of Mlalakuwa <i>Mtaa</i></li> </ul>	No FGD discussions were conducted	◆ 55 household heads in the 2 settlements were interviewed including low-income households	◆ Unpublished PhD thesis by Margaret Ntiyakunze (2005)
7	<b>Mtambani</b>	Community engagement/central				
8	<b>Rufu</b>	Community engagement/peripheral				
9	<b>Kiembe Samaki</b>	Informal land development, self-built housing and informal rental markets – more consolidated settlement	<ul style="list-style-type: none"> <li>◆ 3 brokers</li> <li>◆ 18 owner-builders</li> <li>◆ 12 tenants</li> </ul> (15 females; 18 males)	N.A.	N.A.	
10	<b>Mzinga</b>	Informal land development, self-built housing and informal rental markets – more peripheral settlement	<ul style="list-style-type: none"> <li>◆ 1 leader</li> <li>◆ 3 brokers</li> <li>◆ 16 owners</li> <li>◆ 13 tenants</li> </ul> (20 females; 13 males)	N.A.	N.A.	

## Methods: case studies

	Case study	Land nexus themes	Key informant interviews	Focus group discussions (FGDs)	Household surveys	Notes (including indication of other sources)
<b>Mwanza, Tanzania</b>						
<b>1</b>	<b>Luchelele</b>	New town/ land conflicts	<ul style="list-style-type: none"> <li>◆ 1 Ward councillor</li> <li>◆ 1 WEO</li> <li>◆ 10 <i>Mtaa</i> chairpersons</li> </ul>		◆ 40 land occupiers	
<b>2</b>	<b>Buswelu</b>	New town				
<b>3</b>	<b>Mirongo</b>	Gentrification				
<b>4</b>	<b>Mabatini-Mashinani to Nyamuongolo</b>	Resettlement proposal from flood-prone land	<ul style="list-style-type: none"> <li>◆ 1 WEO for Mabatini ward</li> <li>◆ 1 Nyerere B <i>Mtaa</i> chairperson</li> </ul>	<ul style="list-style-type: none"> <li>◆ 4 people from the Association of Rice Millers</li> <li>◆ About 10 women and 10 men working with rice milling machines</li> </ul>	◆ 37 household heads	
<b>5</b>	<b>Ibungilo and Isamilo</b>	Regularisation	<ul style="list-style-type: none"> <li>◆ 1 Isamilo WEO</li> <li>◆ 2 <i>Mtaa</i> chairpersons for Isamilo North B and Msikitini</li> </ul>	N.A.	◆ 40 household heads	<ul style="list-style-type: none"> <li>◆ Kyessi, A. (2010)<sup>1</sup></li> <li>◆ Kyessi, A. and Kyessi, S. (2007)<sup>2</sup></li> <li>◆ Land Act, No. 4 of 1999</li> </ul>
<b>6</b>	<b>Mabatini and Kilimahewa informal settlements</b>	Clean water and simplified sanitation	<ul style="list-style-type: none"> <li>◆ 2 Mabatini and Nyamaoro WEOs</li> <li>◆ 2 <i>Mtaa</i> chairpersons for Mabatini and Kilimahewa A&amp;B</li> </ul>	N.A.	◆ 40 household heads	
<b>7</b>	<b>Kilimahewa B</b>	Community engagement in central location covering a range of land nexus themes				
<b>8</b>	<b>Ibinza</b>	Community engagement in peripheral location covering a range of land nexus themes				
<b>9</b>	<b>Kiloleli B</b>	Informal land development, self-built housing and informal rental markets – more consolidated settlement	<ul style="list-style-type: none"> <li>◆ 1 leader</li> <li>◆ 3 brokers</li> <li>◆ 17 owners</li> <li>◆ 9 tenants</li> </ul> (16 females; 14 males)			
<b>10</b>	<b>Nyasaka</b>	Informal land development, self-built housing and informal rental markets – more peripheral settlement	<ul style="list-style-type: none"> <li>◆ 1 leader</li> <li>◆ 3 brokers</li> <li>◆ 16 owners</li> <li>◆ 12 tenants</li> </ul> (17 females; 15 males)			

## Methods: case studies

	Case study	Land nexus themes	Key informant interviews	Focus group discussions (FGDs)	Household surveys	Notes (including indication of other sources)
<b>Khartoum, Sudan</b>						
1	<b>Al-Fateh</b>	Relocation/ resettlement, inclusion/ exclusion of new migrants, and the impact of relocation and resettlement policies	<ul style="list-style-type: none"> <li>Planners of the Ministry of Planning</li> </ul>	<ul style="list-style-type: none"> <li>3 FGDs</li> <li>Public committee</li> <li>3 community leaders</li> <li>3 NGO members</li> </ul>	<ul style="list-style-type: none"> <li>200 door-to-door sample surveys (80% women – the survey was taken during the working day)</li> </ul>	<ul style="list-style-type: none"> <li>Observations</li> <li>Survey maps, compared to Google maps</li> <li>Retired planners worked in the area</li> <li>New FGD with working women (included working women within the neighbourhood)</li> </ul>
2	<b>Burri</b>	Trends of gentrification and physical transformation in an inner-city neighbourhood	<ul style="list-style-type: none"> <li>Bureau of Statistics</li> <li>3 brokers (1 with social media)</li> </ul>	<ul style="list-style-type: none"> <li>1 FGD</li> <li>Public committee members</li> </ul>	<ul style="list-style-type: none"> <li>100 door-to-door sample surveys (20% women)</li> </ul>	<ul style="list-style-type: none"> <li>Observations</li> <li>Survey maps</li> </ul>
3	<b>Al-Jereif West</b>	Inclusion or not of immigrant communities, rental market investigation	<ul style="list-style-type: none"> <li>2 brokers</li> <li>10 owners</li> <li>10 tenants (12 females; 8 males)</li> </ul>	<ul style="list-style-type: none"> <li>3 FGDs</li> <li>Public committee</li> <li>3 community leaders</li> <li>Representatives of immigrants (50% women)</li> </ul>	<ul style="list-style-type: none"> <li>150 door-to-door sample surveys (10% women)</li> </ul>	<ul style="list-style-type: none"> <li>Observations</li> </ul>
4	<b>Khogalab</b>	'White land' (land registered by the state but where no construction has happened yet) policy impact towards middle incomers	<ul style="list-style-type: none"> <li>15 recipients</li> <li>6 brokers (3 women; 18 men; 5 with social media network)</li> </ul>	<ul style="list-style-type: none"> <li>1 FGD</li> <li>Planners and surveyors of the Ministry of Planning</li> </ul>	N.A.	<ul style="list-style-type: none"> <li>Observations</li> <li>Survey maps, compared to Google maps</li> </ul>
5	<b>Al-Shohada Old Neighbourhood in Omdurman</b>	Urban densification and CBD functions encroach, physical transformation	<ul style="list-style-type: none"> <li>Planners of the Ministry of Planning</li> </ul>	<ul style="list-style-type: none"> <li>2 FGDs</li> <li>Public committee</li> <li>3 community leaders</li> </ul>	<ul style="list-style-type: none"> <li>100 door-to-door sample surveys (60% women)</li> </ul>	<ul style="list-style-type: none"> <li>Observations</li> </ul>
6	<b>Soba West</b>	Peri-urban transitions/ regularisation process of urban and physical transformation		<ul style="list-style-type: none"> <li>4 FGDs</li> <li>Ministry of Planning</li> <li>Public committee</li> <li>3 community leaders</li> <li>2 brokers</li> </ul>	<ul style="list-style-type: none"> <li>150 door-to-door sample surveys (35% women)</li> </ul>	<ul style="list-style-type: none"> <li>Observations</li> </ul>
7	<b>Manshya East</b>	Peri-urban transitions/land take and impact of enabling strategy	<ul style="list-style-type: none"> <li>Investment Unit of National Social Security Fund</li> <li>Sogatra company</li> <li>Housing developer</li> <li>9 brokers</li> <li>12 recipients</li> </ul>	<ul style="list-style-type: none"> <li>2 FGDs</li> <li>Officials of Land Administration</li> <li>Planners of the Ministry of Planning</li> </ul>	N.A.	<ul style="list-style-type: none"> <li>Observations</li> <li>Survey maps, compared to Google maps</li> </ul>

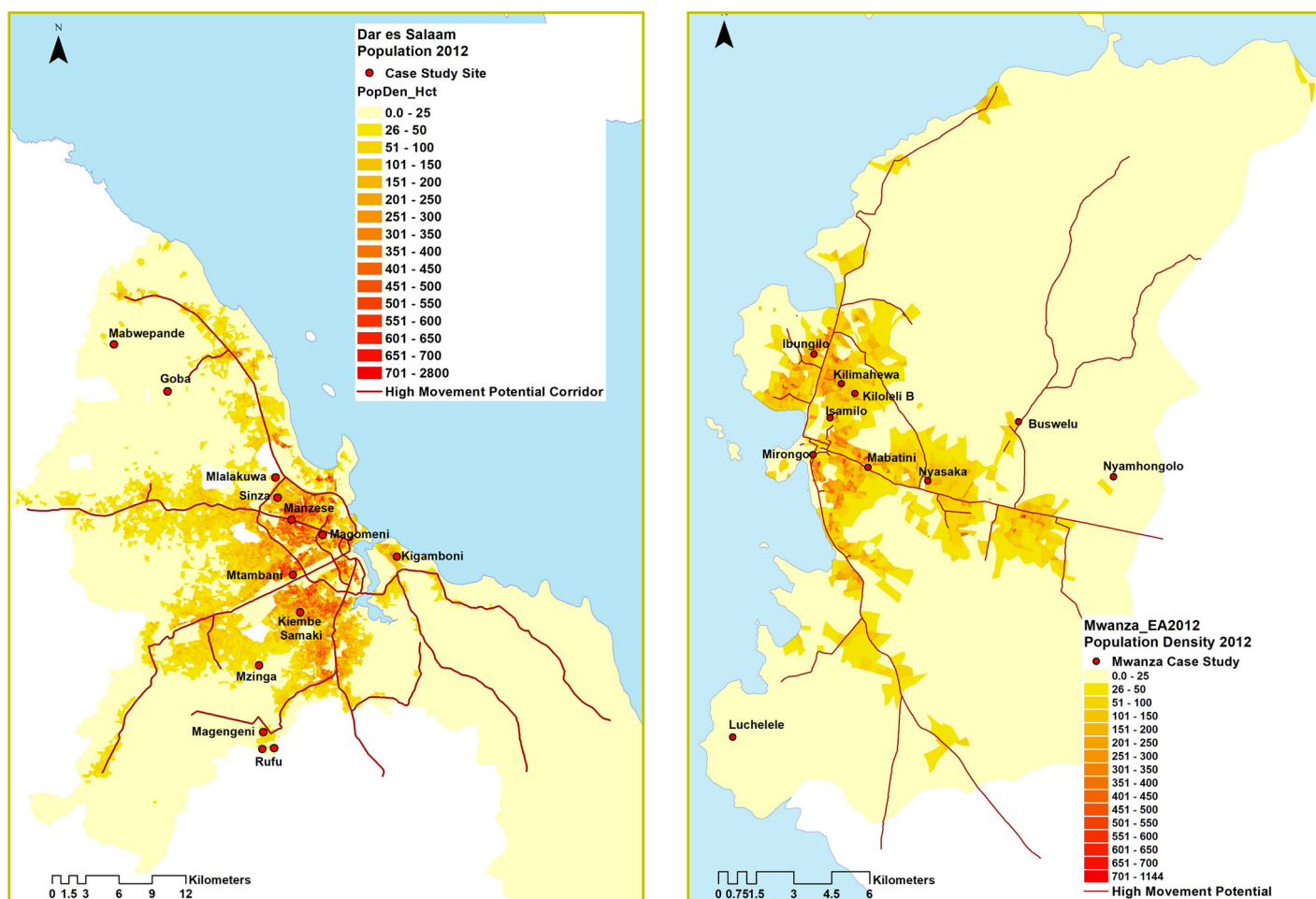
## Methods: case studies

	Case study	Land nexus themes	Key informant interviews	Focus group discussions (FGDs)	Household surveys	Notes (including indication of other sources)
<b>Khartoum, Sudan</b>						
8	<b>Umbadda Abu Niran</b>	Re-planning/upgrading informal settlements/urban integration	<ul style="list-style-type: none"> <li>◆ Former public re-planning committee members</li> <li>◆ Planners of the Ministry of Planning</li> </ul>	<ul style="list-style-type: none"> <li>◆ 4 FGDs</li> <li>◆ Public committee</li> <li>◆ 18 community leaders</li> <li>◆ 2 NGO members</li> <li>◆ 2 social insider (tribal leader)</li> <li>◆ 2 tenants</li> </ul>	N.A.	<ul style="list-style-type: none"> <li>◆ Observations</li> <li>◆ Survey maps, compared to Google maps</li> <li>◆ Retired planners worked in the area (includes public officers who did the basic survey in 1976)</li> <li>◆ Planning decisions since 1976</li> </ul>
9	<b>Kalakla Gatiya</b>	Inclusion or not of immigrant communities, rental market	<ul style="list-style-type: none"> <li>◆ 3 brokers</li> <li>◆ 15 owners</li> <li>◆ 12 tenants (14 females; 13 males)</li> </ul>	<ul style="list-style-type: none"> <li>◆ 5 FGDs</li> <li>◆ Public committee</li> <li>◆ 10 community leaders</li> <li>◆ 2 NGO members</li> <li>◆ 3 planning officers</li> <li>◆ 1 Christian priest</li> <li>◆ 2 lawyers</li> </ul>	N.A.	<ul style="list-style-type: none"> <li>◆ Observations</li> <li>◆ Survey maps, compared to Google maps</li> <li>◆ Basic maps and planning decisions since 1992</li> </ul>
10	<b>Hillat Hamad</b>	Densification/spontaneous identity/urban transformation	<ul style="list-style-type: none"> <li>◆ 13 owners</li> <li>◆ 2 tenants (8 females; 7 males)</li> </ul>	<ul style="list-style-type: none"> <li>◆ 2 FGDs</li> <li>◆ 3 planning officers</li> <li>◆ 5 first residence (1 via social media)</li> <li>◆ 1 Christian priest</li> </ul>	N.A.	<ul style="list-style-type: none"> <li>◆ Observations</li> <li>◆ Survey maps, compared to Google maps</li> <li>◆ Historian professor: Jafar Mirghani</li> </ul>

## Notes

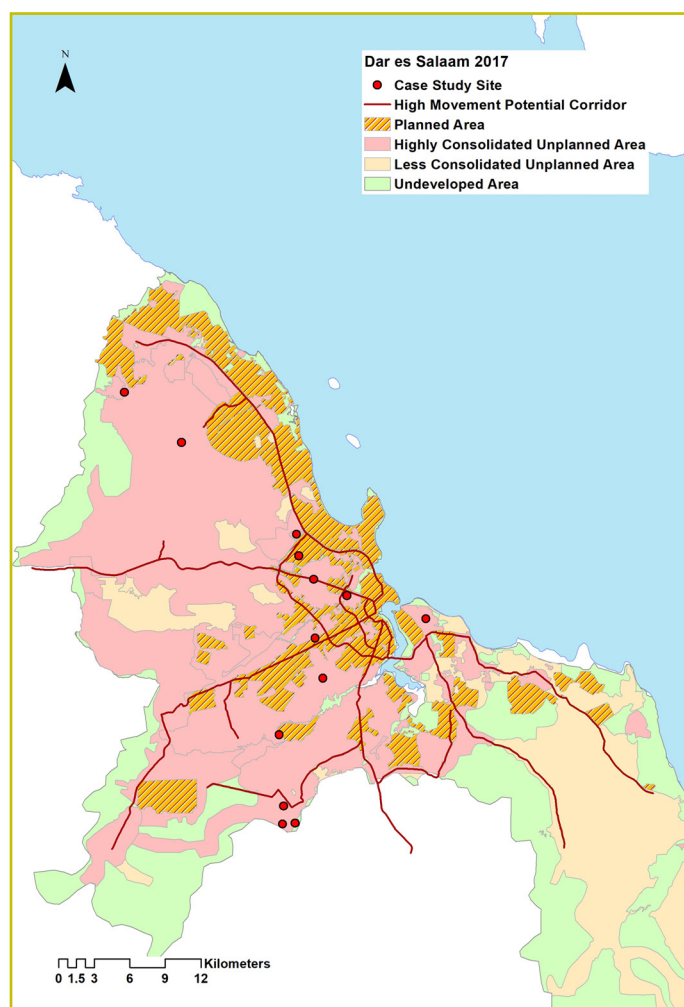
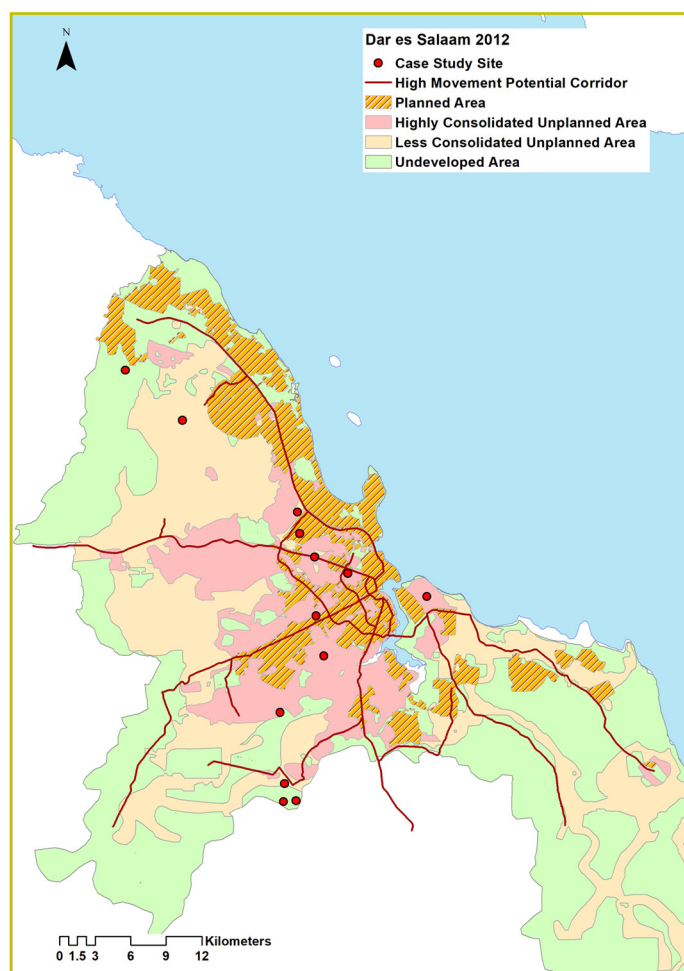
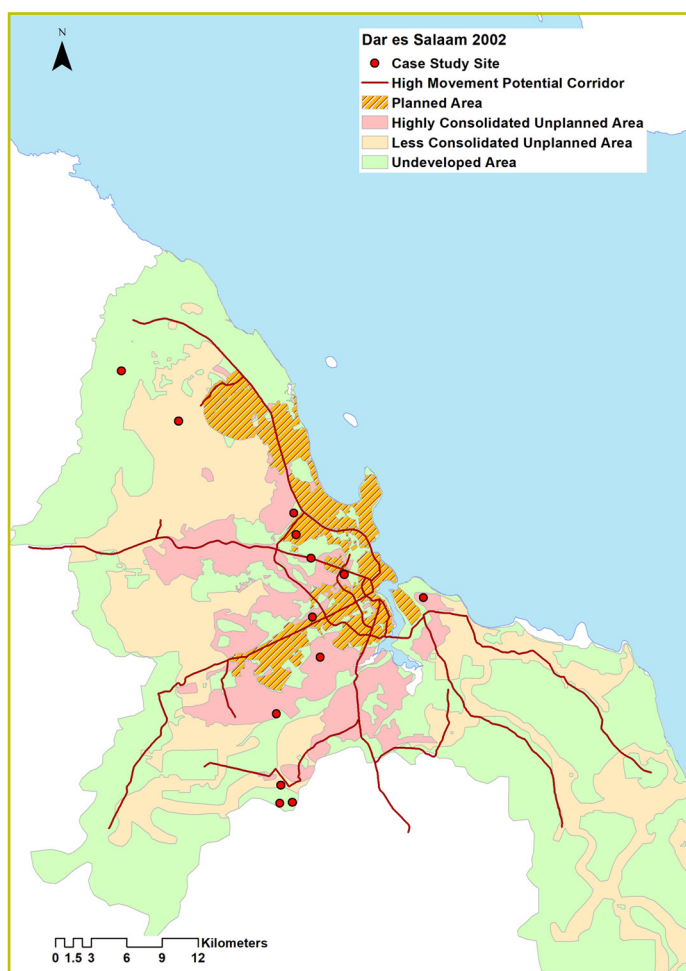
- 1 Kyessi, A. (2010) 'Enhancing Security of Land Tenure in Informal Settlements: The Case of WAT Human Settlements Trust in Hanna Nassif Settlement, Dar es Salaam, Tanzania', *Utafiti Journal* 8: 87–104.
- 2 Kyessi, S. and Kyessi, A. (2007) *Regularisation and Formalisation of Informal Settlements in Tanzania: Opportunities and Challenges: A Case of Dar-es-Salaam City*, Hong Kong: International Office for Cadastre and Land Records (OICRF).

# Annexe D – Additional maps

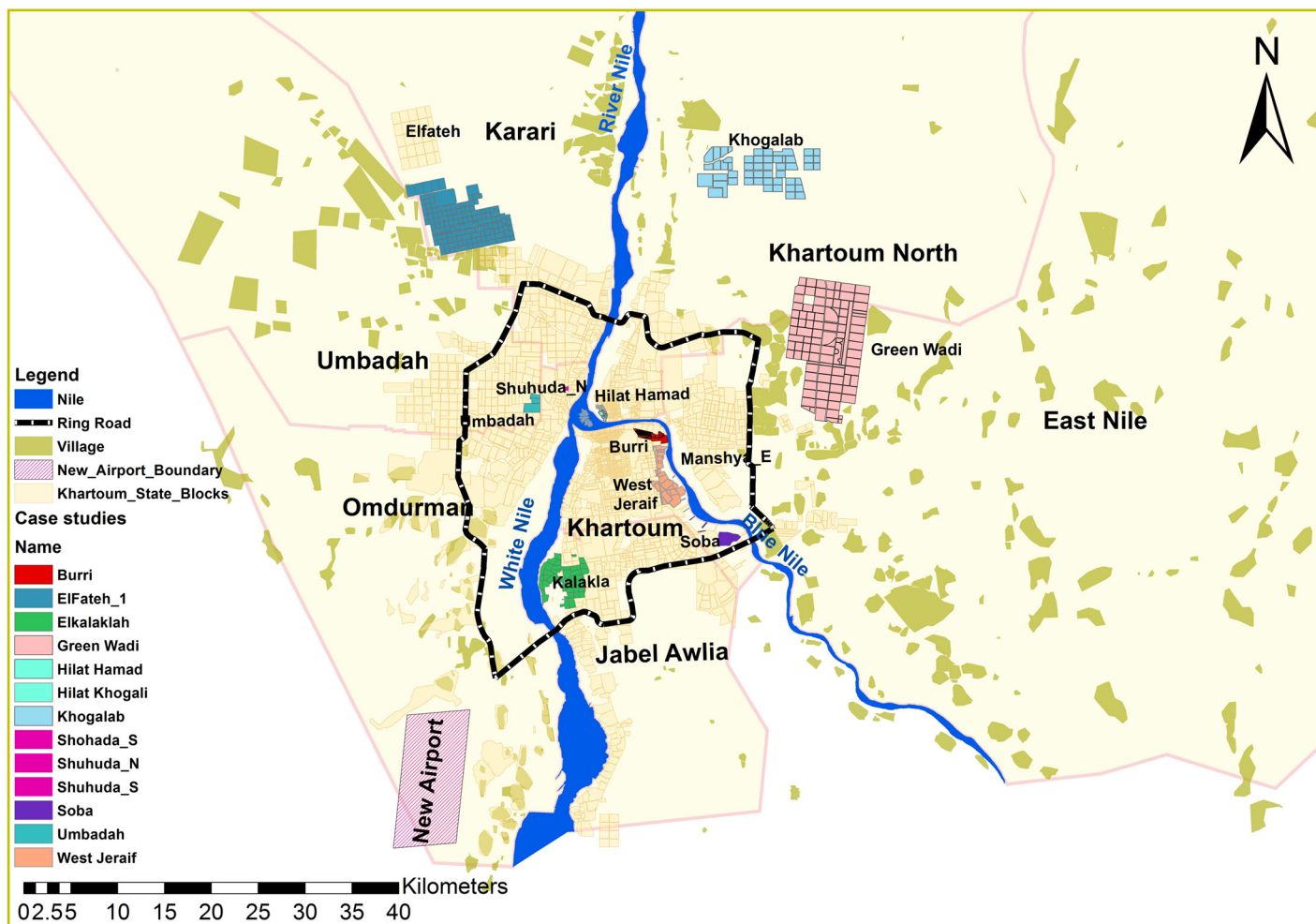


**Figure A2** Location of case study sites – Dar es Salaam (left) and Mwanza, Tanzania. Source: Data provided by the National Bureau of Statistics (Tanzania) through Ardhi University.

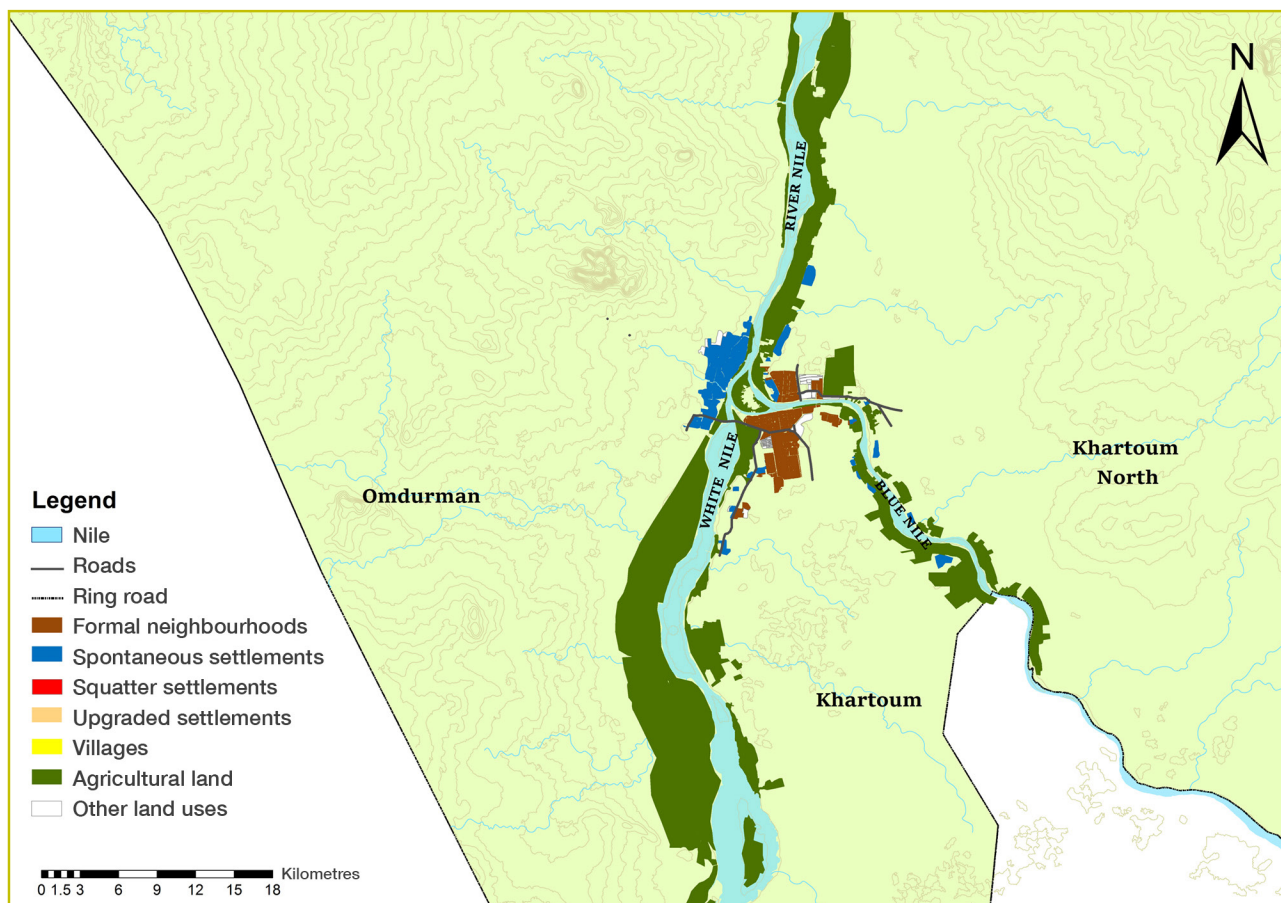




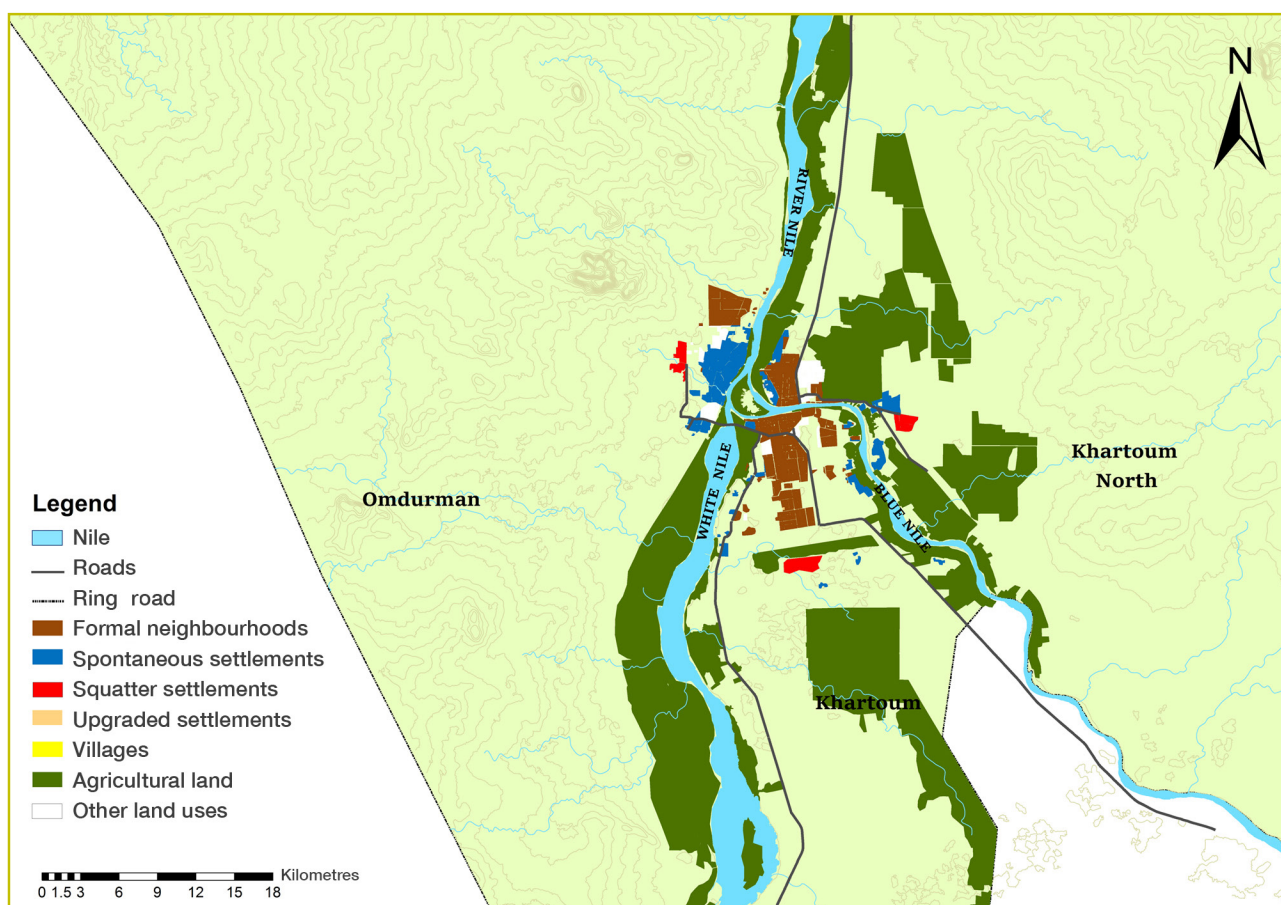
**Figure A3** Settlement growth and development 2002 (top left), 2012 (top right), and 2017 (below right), Dar es Salaam, Tanzania. Source: Settlement boundaries and types generated from QuickBird satellite images by Ardhi University.



**Figure A4** Location of case study sites, Khartoum, Sudan. Source: Data for maps provided by the Ministry of Planning and the Ministry of Infrastructure, Khartoum State. Maps generated and coordinated by the University of Khartoum.

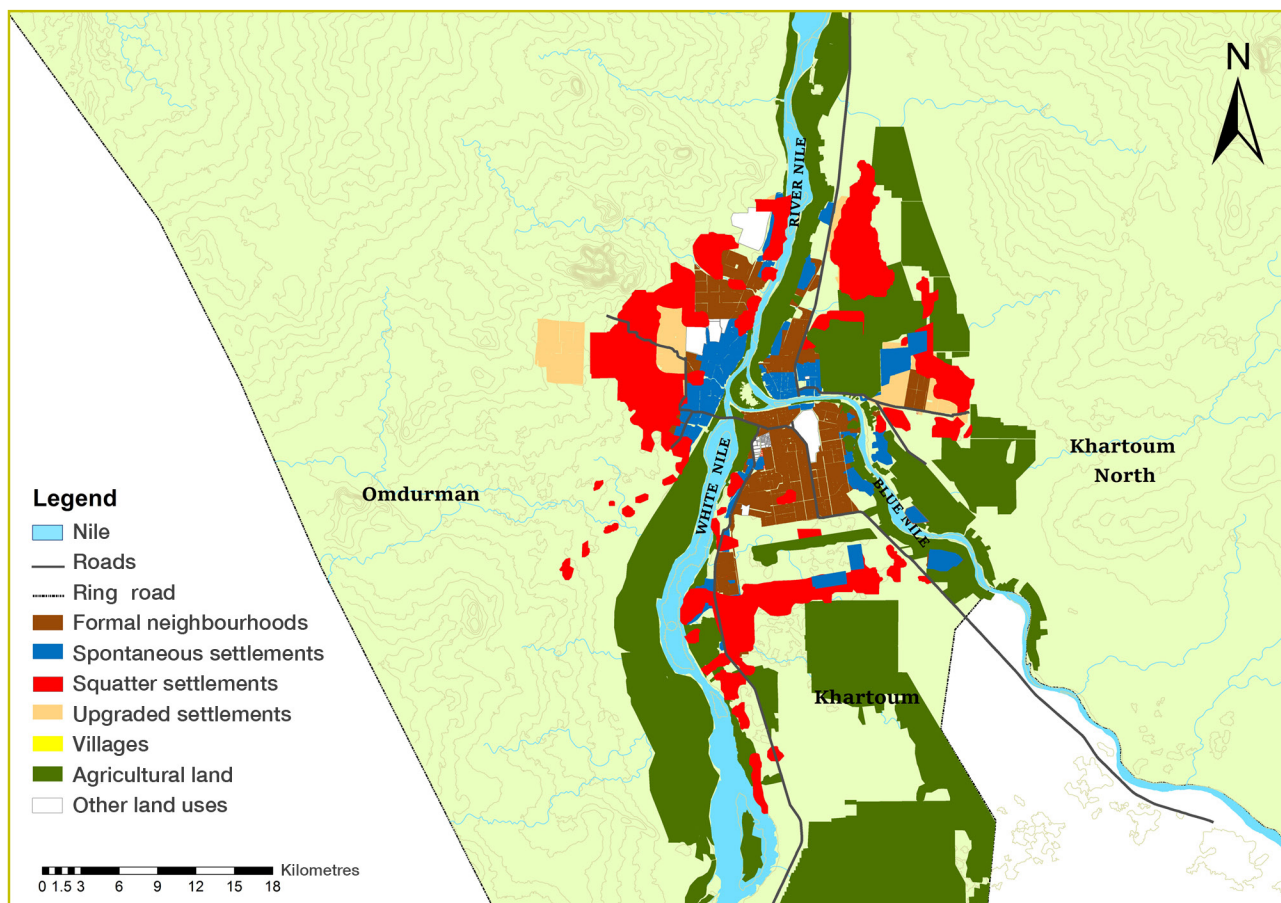


**Figure A5** Khartoum, 1956. Source: Data for maps provided by the Ministry of Planning and the Ministry of Infrastructure, Khartoum State. Maps generated and coordinated by the University of Khartoum.

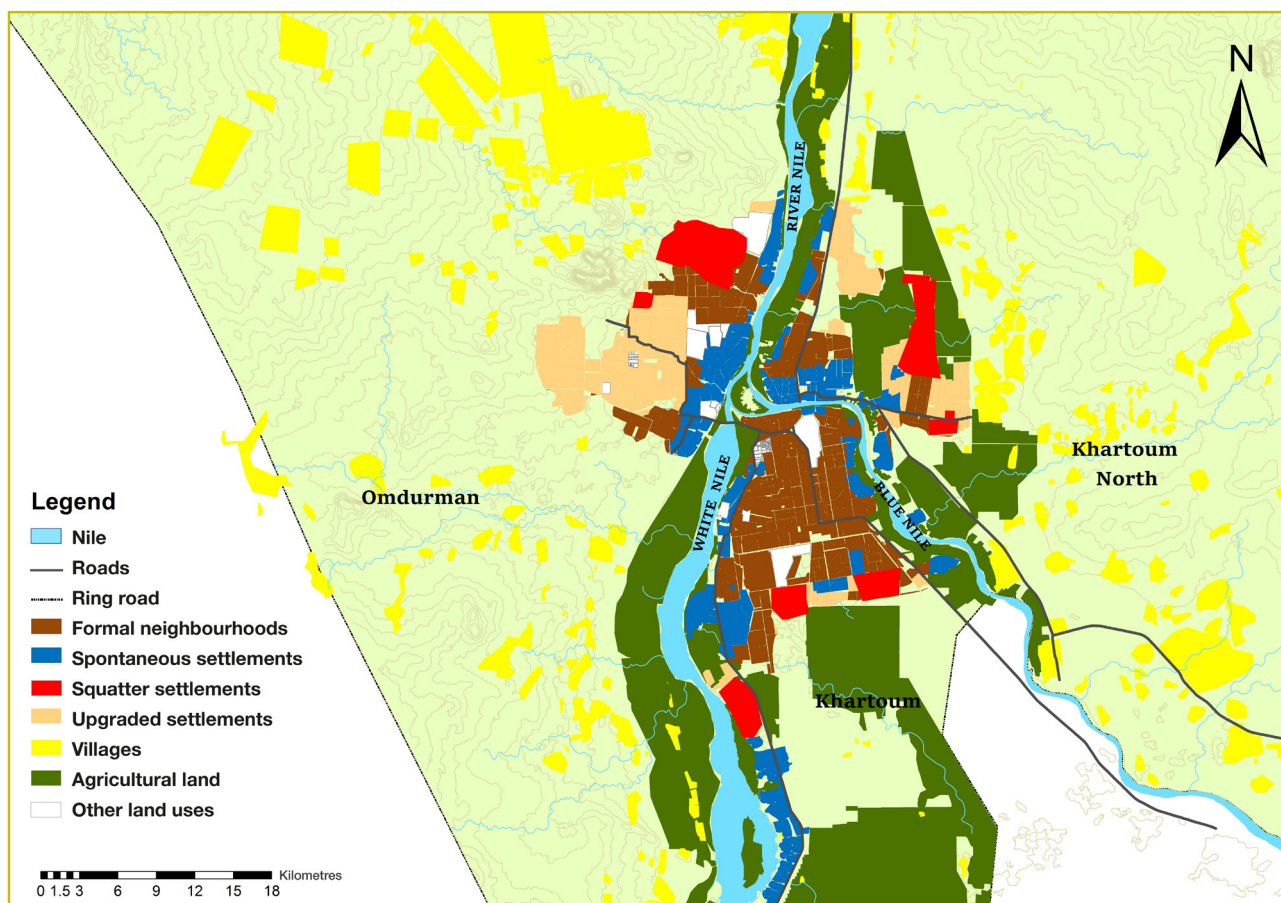


**Figure A6** Khartoum, 1975. Source: Data for maps provided by the Ministry of Planning and the Ministry of Infrastructure, Khartoum State. Maps generated and coordinated by the University of Khartoum.



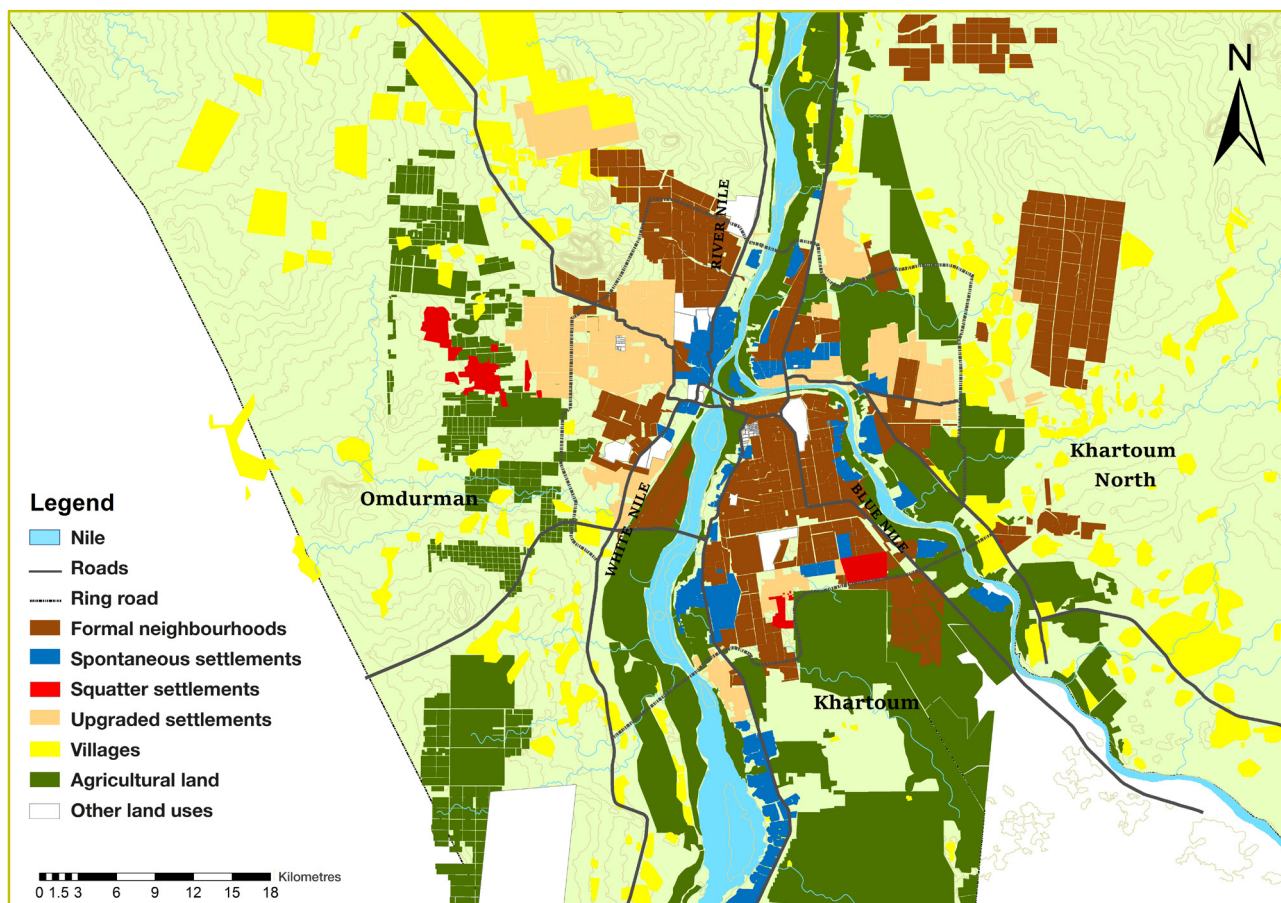


**Figure A7** Khartoum, 1990. Source: Data for maps provided by the Ministry of Planning and the Ministry of Infrastructure, Khartoum State. Maps generated and coordinated by the University of Khartoum.

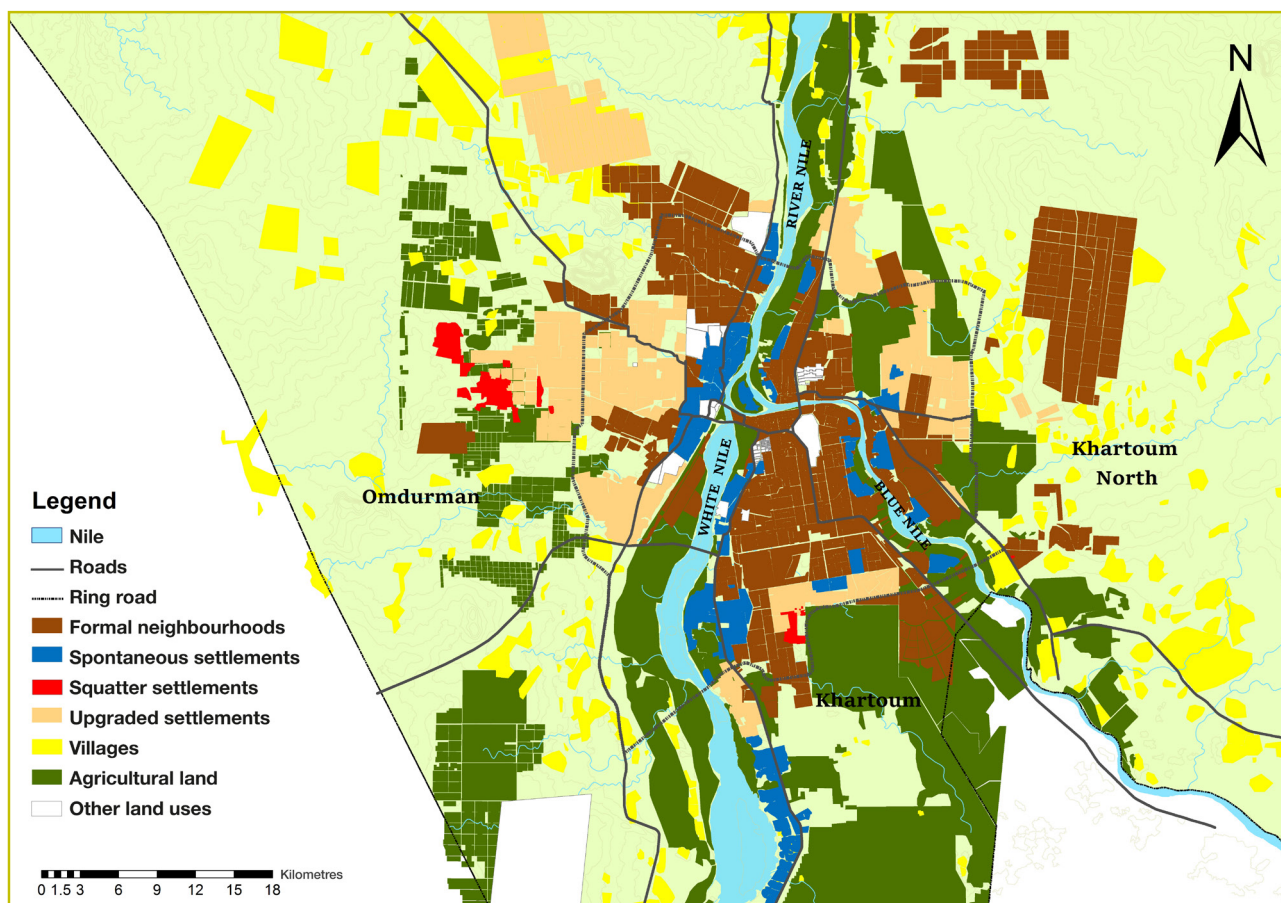


**Figure A8** Khartoum, 2000. Source: Data for maps provided by the Ministry of Planning and the Ministry of Infrastructure, Khartoum State. Maps generated and coordinated by the University of Khartoum.



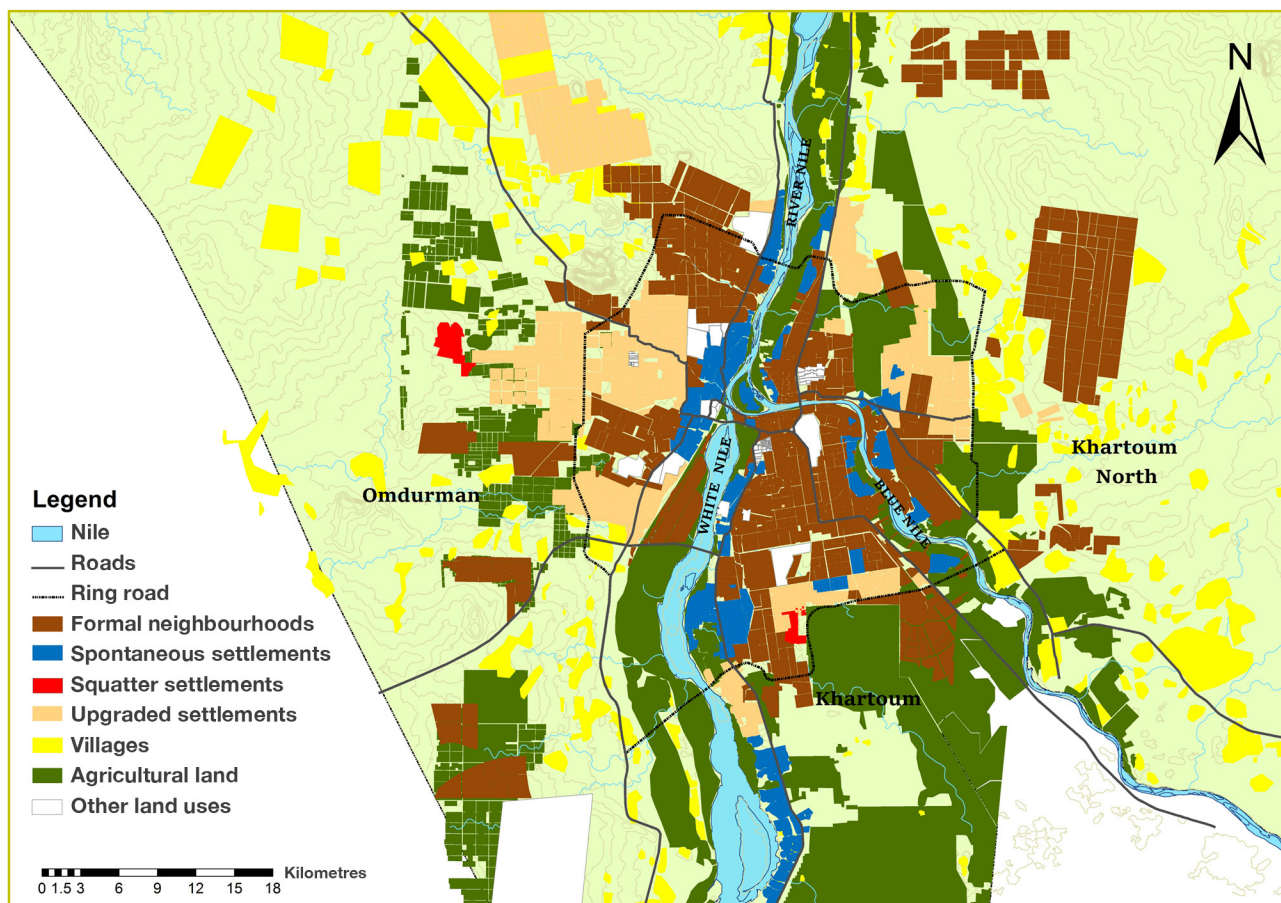


**Figure A9** Khartoum, 2008. Source: Data for maps provided by the Ministry of Planning and the Ministry of Infrastructure, Khartoum State. Maps generated and coordinated by the University of Khartoum.



**Figure A10** Khartoum, 2014. Source: Data for maps provided by the Ministry of Planning and the Ministry of Infrastructure, Khartoum State. Maps generated and coordinated by the University of Khartoum.





**Figure A11** Khartoum, 2017. Source: Data for maps provided by the Ministry of Planning and the Ministry of Infrastructure, Khartoum State. Maps generated and coordinated by the University of Khartoum.